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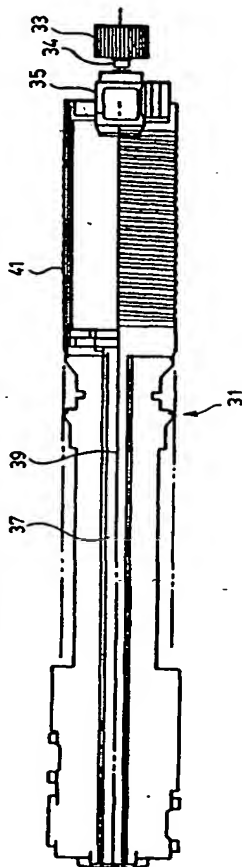
PCT

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[Continued on next page]

(54) Title: PIPE MOLDING APPARATUS WITH MOLD TUNNEL AIR TURBULENCE



(57) Abstract: An extruding apparatus which extrudes continuous length of hollow plastic product has an extruder (3) which feeds molten plastic through die equipment (5) to a mold tunnel (7) formed by side by side moving mold blocks (9). The apparatus includes air turbulence internally of the product within the mold tunnel to assist in setting shape of the product. The air turbulence is provided by an air moving member (17) located internally of the product within the mold tunnel and a power source for the air moving member. The power source is located externally of the mold tunnel and a power transfer is provided to feed power from the power source through the die equipment to the air moving member without cooling of the die equipment.

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WO 2004/045829 A1

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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PIPE MOLDING APPARATUS WITH MOLD TUNNEL AIR TURBULENCEFIELD OF THE INVENTION

5 The present invention relates to a molding apparatus using a moving mold tunnel with internal air turbulence to help set shape of the product in the mold tunnel.

BACKGROUND OF THE INVENTION

10 It is known in plastic extruders which use moving mold tunnels that it is important to provide efficient cooling within the mold tunnel. This efficiency is required because a moving mold tunnel is relatively short in length compared to fixed extruders.

15 Corma Inc. of Toronto, Ontario, Canada has over the last few years developed different cooling methods to cool plastic pipe formed in a moving mold tunnel extruder. Some of these methods have involved the pushing of air from the downstream end of the mold tunnel in an upstream direction into the mold tunnel. Corma Inc. has avoided the moving of cooling air in a downstream direction to the mold tunnel because this would necessitate the cooling air passing through and
20 undesirably cooling the actual die equipment. It would also heat the cooling air. This die equipment must stay in its heated condition to produce a proper flow of molten plastic through the die equipment to the mold tunnel.

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SUMMARY OF THE PRESENT INVENTION

Corma Inc. has now discovered that pipe made in an extruder using a moving mold tunnel can be assisted to set to shape within the mold tunnel using air turbulence
35 only internally of the mold tunnel without necessarily having to add additional cooling to the air turbulence.

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In view of the Corma Inc. discovery the present invention relates to an extruding apparatus which extrudes continuous length of hollow plastic product e.g., plastic pipe or the like and having internal mold tunnel turbulence. The apparatus comprises an extruder which feeds molten plastic through die equipment to a mold tunnel formed by side by side moving mold blocks. The plastic product is shaped within the mold tunnel.

The apparatus includes means to provide air turbulence to assist in setting shape of the product. The means to provide the air turbulence comprises an air moving member which is physically located internally of the product in the mold tunnel. Also provided is a power source for the air moving member. The power source is however located externally of the mold tunnel and powers the air moving member through a power transfer which feeds from the power source through the die equipment to the air moving member.

20

In accordance with the invention as described immediately above, there is no transfer of moving air through the die equipment which would have an adverse affect of cooling the die equipment. In contrast, even though the power source for the air moving member is outside of the mold tunnel the only air movement is created internally of the mold tunnel with the means to transfer power from the power source to the air moving member feeding through the die equipment. This transfer means does not produce any adverse cooling of the die equipment.

30

The feeding of power to the air moving member from the power source to the air moving member through the die equipment upstream of the mold tunnel eliminates the need to place additional working equipment at the downstream

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end of the tunnel where it would be difficult to position because of the continuous outfeeding of the product through the downstream end of the tunnel.

5 BRIEF DESCRIPTION OF THE DRAWINGS

The above as well as other advantages and features of the present invention will be described in greater detail according to the preferred embodiments of the present invention in which;

10

Figure 1 is a schematic view of a plastic pipe extruder with a moving mold tunnel incorporating air turbulence within the mold tunnel according to a preferred embodiment of the present invention;

15

Figure 2 is an enlarged view of the internal region of the mold tunnel from Figure 1;

Figure 3 is a side view of die equipment with downstream end air turbulating features to be incorporated into a plastic pipe extruder with moving mold tunnel according to a further preferred embodiment of the present invention;

25 Figure 4 is an enlarged view of the downstream end of the die equipment of Figure 3;

Figure 5 is a side view of die equipment with downstream end turbulating features to be incorporated into a plastic pipe extruder with a moving mold tunnel according to yet another preferred embodiment of the present invention;

35 Figure 6 is an enlarged view of downstream end of the die equipment of Figure 5; and

Figure 7 is an enlarged view of the downstream end of die equipment for use with a plastic pipe extruder according to still a further preferred embodiment of the present invention.

5

DETAILED DESCRIPTION ACCORDING TO THE PREFERRED EMBODIMENTS OF THE PRESENT INVENTION IN WHICH:

Figure 1 shows a pipe extruding apparatus generally indicated at 1. This apparatus includes an extruder 3 which provides a supply of molten plastic along die equipment 5 to a moving mold tunnel generally indicated at 7. This mold tunnel is formed by mold block sections 9 to opposite sides of the tunnel. The mold block sections move side by side with one another and close around the downstream end of the die equipment to provide a molding path for forming a continuous length of plastic pipe generally indicated at 15. Located on the downstream end of die equipment 5 is a cooling plug 13 over which the plastic from the die equipment runs to help set the shape of the pipe which is also in place on the faces of the mold by suction through the mold blocks.

In accordance with the present invention, air turbulence is created internally of the pipe 15 while the pipe remains in the mold tunnel. This air turbulence assists in setting the shape of the pipe while it is in the mold tunnel.

The air turbulence is provided by means of an air moving member e.g., a rotor 17 which is physically located internally of the pipe at the downstream end of the cooling plug 13. In the embodiment shown in Figure 1 of the drawings rotor 17 which, as better seen in Figure 2 of the drawings, comprises a rotary wheel having a plurality of blades 18 peripherally of the wheel. This wheel is rotated by means of a drive shaft 19. This

drive shaft fits through a channel 6 centrally of the die equipment 5 and then through a further channel 14 centrally of the cooling plug 13 to the rotor 17.

5 Shaft 19 has an upstream end which is located at the upstream end of die equipment 5 and which is rotated by a motor 23 located outside of the die equipment. Motor 23 is powered by an electrical power supply 21 wired at 25 to motor 23.

10

Figure 3 of the drawings shows a modified version of a drive for a rotor internally of a moving mold tunnel. More specifically, Figure 3 shows die equipment 31 and associated cooling plug 41. Provided at the downstream end of cooling plug 41 is a turbulence creating rotor 33. In this case, the motor 35 for rotating the rotor 33 is located directly beside the rotor. The cooling plug 41 is recessed at its downstream end providing mounting support for motor 35. Motor 35 then includes a shaft 34 extending to rotor 33.

The wiring 39 which provides electrical power for motor 35 feeds centrally through cooling plug 41 in an upstream direction back through a central channel 37 provided in die equipment 31. This wire then connects to a power supply outside of the apparatus.

In both of the above cases the rotor is operated by an electrically driven motor which in one example is located outside of the die equipment and the mold tunnel and which in another example is located directly within the mold tunnel. However, in both cases the electrical power for the motor is located outside of the die equipment and in neither case does the connection from the power to the rotor produce any cooling of the die equipment.

Figures 5 and 6 show another preferred embodiment of the present invention. According to this embodiment a bladed wheel air moving member 65 is provided at the downstream end of a cooling plug 58 which is in turn provided at the downstream end of die equipment 51. The cooling plug, the downstream end of the die equipment and the bladed wheel 65 when in use will all be located internally of a moving mold tunnel of a plastic extruder.

In this particular embodiment the die equipment 51 has a central channel 53 which feeds water under pressure to the closed coils 59 which wrap helically around cooling plug 58. Die 51 is well insulated around the water feed passage 53 to ensure that the die is not adversely cooled by the water and to further ensure that the water is not significantly heated by the die before it reaches the cooling plug.

In accordance with the present invention, the pressurized water flowing through the die and then flowing through the cooling plug is outlet from the cooling plug at a further flow line 61. This flow line directs the water still under pressure into a water turbine 63. Water turbine 63 is connected by drive shaft 64 to bladed wheel 65. The water turbine is sealed so that the water in the turbine does not escape into the mold tunnel but rather exits the turbine at a water outlet 67 which then flows back through passage 53 in die equipment 51.

The source of pressure for the water which drives turbine 63 and rotates rotor 65 is provided externally of the die equipment. In this case, the flow of pressurized water from that source provides the transfer of power from the pressurized water source through the die

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equipment to the turbine and the rotor.

Figure 7 of the drawings shows another preferred embodiment of the present invention. According to this
5 embodiment, an air turbulating system generally indicated at 71 is used to assist in setting shape of a plastic pipe P internally of a mold tunnel of a plastic extruder. Turbulating system 71 comprises a propeller style blade formed by a plurality of blade members each of which has
10 a larger outer blade portion 73 and a smaller inner blade portion 75 secured to a drive shaft 77. Drive shaft 77 extends in an upstream direction centrally through a cooling plug 79 and die equipment 81 of the extrusion equipment. Once again, the power supply for rotating
15 shaft 77 and the propeller style blades mounted to the shaft is located externally of the die equipment.

In this particular embodiment the propeller styling of the blade creates an extremely efficient air
20 flow pattern. More particularly, the turbulence created by the outer blade portions 73 is greater than the turbulence created by the inner blade portions 75 of the blades. This produces an air flow pattern internally of the mold tunnel in which the air moved by the outer blade
25 portions indicated by arrows 74 is relatively high pressure air forced to move in a downstream direction along the inner surface of pipe P. This air turbulence along the pipe helps to set the shape of the pipe while it is in the mold tunnel.

30 As a result of the above, air internally of the pipe which becomes heated as a result of its proximity to the pipe is forced out the open downstream end of the mold tunnel by the blades. At the same time, blade
35 portions 75 of the blades which produce a much lower air pressure than blade portions 73 act as a negative

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pressure air draw. Therefore the inner blade portions draw cooler air in the direction of arrows 76 from outside of the mold tunnel into the open end of the tunnel in an upstream direction back to the propeller
5 blade. This air then acts as make-up air for the air displaced in the downstream direction by the blades and has the benefit that it is cooler than the displaced air.

If additional setting of the pipe in the mold
10 tunnel is required then further make-up air specifically cooled for pipe cooling purposes can also be introduced from the downstream end of the mold tunnel. In addition, moisture as indicated at 81 can be added to the make-up
15 air to provide for further cooling of the pipe in the mold tunnel.

Although various preferred embodiments of the present invention have been described in detail, it will be appreciated by those skilled in the art that
20 variations may be made without departing from the spirit of the invention or the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An extruding apparatus which extrudes continuous length of hollow plastic product, said apparatus
5 comprising an extruder which feeds molten plastic through die equipment to a mold tunnel formed by side by side moving mold blocks, the plastic product being shaped within the mold tunnel, said apparatus including means to provide air turbulence to assist in setting shape of the
10 product, said means comprising an air moving member which is located internally of the product in the mold tunnel, a power source for said air moving member, said power source being located externally of the mold tunnel, and a power transfer which feeds from said power source through
15 die equipment to said air moving member.
2. An extruding apparatus as claimed in Claim 1 wherein said apparatus comprises a vacuum forming plastic pipe extruder including a cooling plug within the mold
20 tunnel, the product comprising a hollow pipe shaped between the mold blocks and the cooling plug, said air moving member being located downstream of and adjacent to the cooling plug, said power transfer feeding through the cooling plug to the air moving member.
- 25 3. An extruding apparatus as claimed in Claim 1 wherein said air moving member comprises a rotor.
- 30 4. An extruding apparatus as claimed in Claim 3 wherein said rotor comprises a bladed wheel.
- 35 5. An extruding apparatus as claimed in Claim 3 wherein said rotor comprises a plurality of blades having inner and outer blade portions, each of said blades being mounted at said inner blade portions to a common mounting shaft for rotating said blades, said inner and outer

blade portions being arranged such that said outer blade portions provide greater positive air pressure than said inner portions to produce a low pressure air draw at said inner blade portions.

5

6. An extruding apparatus as claimed in Claim 5 wherein said mold tunnel has an open downstream end, the positive air pressure produced by said rotor causing an exhausting of air along the pipe through the downstream
10 end of the tunnel, the low air pressure air draw providing fresh make up air to be drawn into the tunnel through the downstream end of the tunnel.

7. An extruding apparatus as claimed in Claim 3
15 wherein said transfer member comprises a rotary shaft extending through said die equipment and the cooling plug to said rotor.

8. An extruding apparatus as claimed in Claim 7
20 including a motor for rotating said shaft, said motor being located externally of said die equipment and receiving power from an electrical power source.

9. An extruding apparatus as claimed in Claim 3
25 including a motor for turning said rotor, said motor being coupled with rotor in said mold tunnel, said transfer member comprising a an electrical power cord running through said die equipment and said cooling plug from a source of electric power to said motor.

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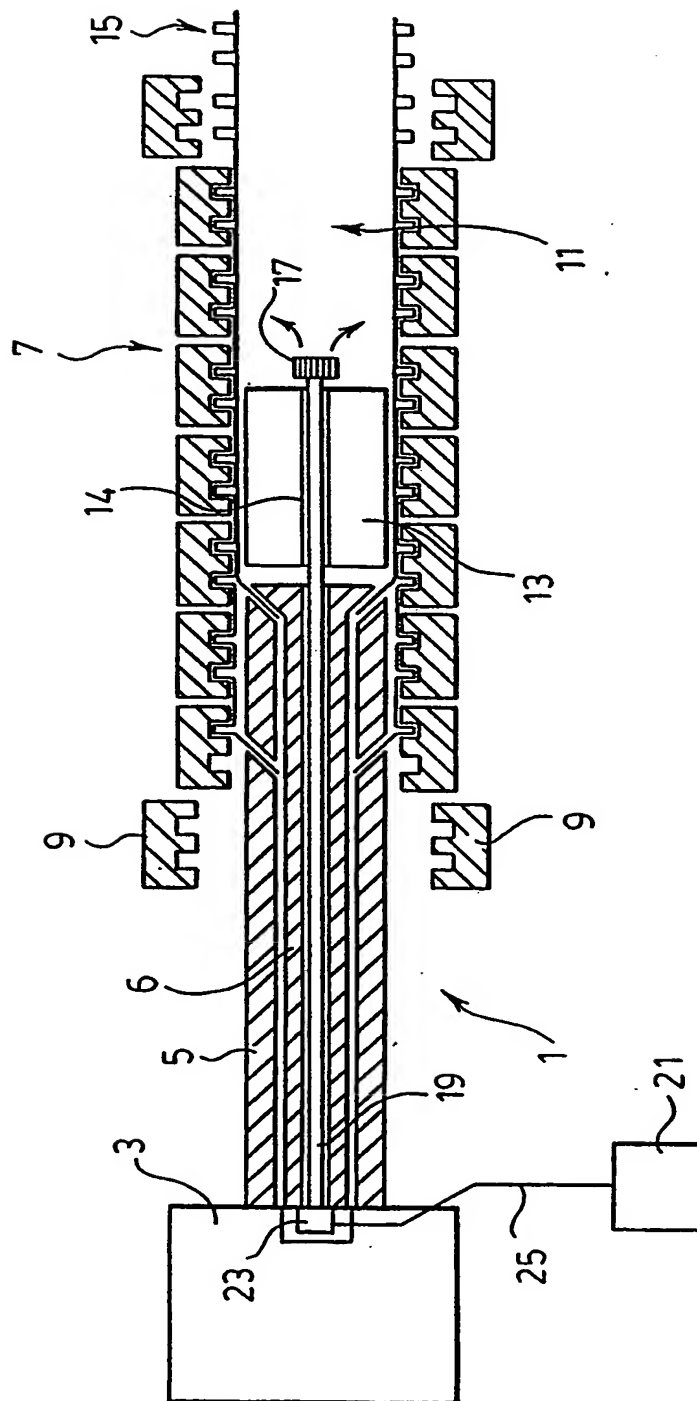
10. An extruding apparatus as claimed in Claim 3 wherein said rotor is driven by a water turbine adjacent said rotor in said mold tunnel, said transfer member comprising a flow channel through said die equipment and
35 said cooling plug, send flow channel delivery water under pressure from a source of pressurized water externally of

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said die equipment to said water turbine.

11. An extruding apparatus a claimed in Claim 3
including a water supply for adding water to the air
5 moved internally of the pipe by said air moving member.

FIG. 1.



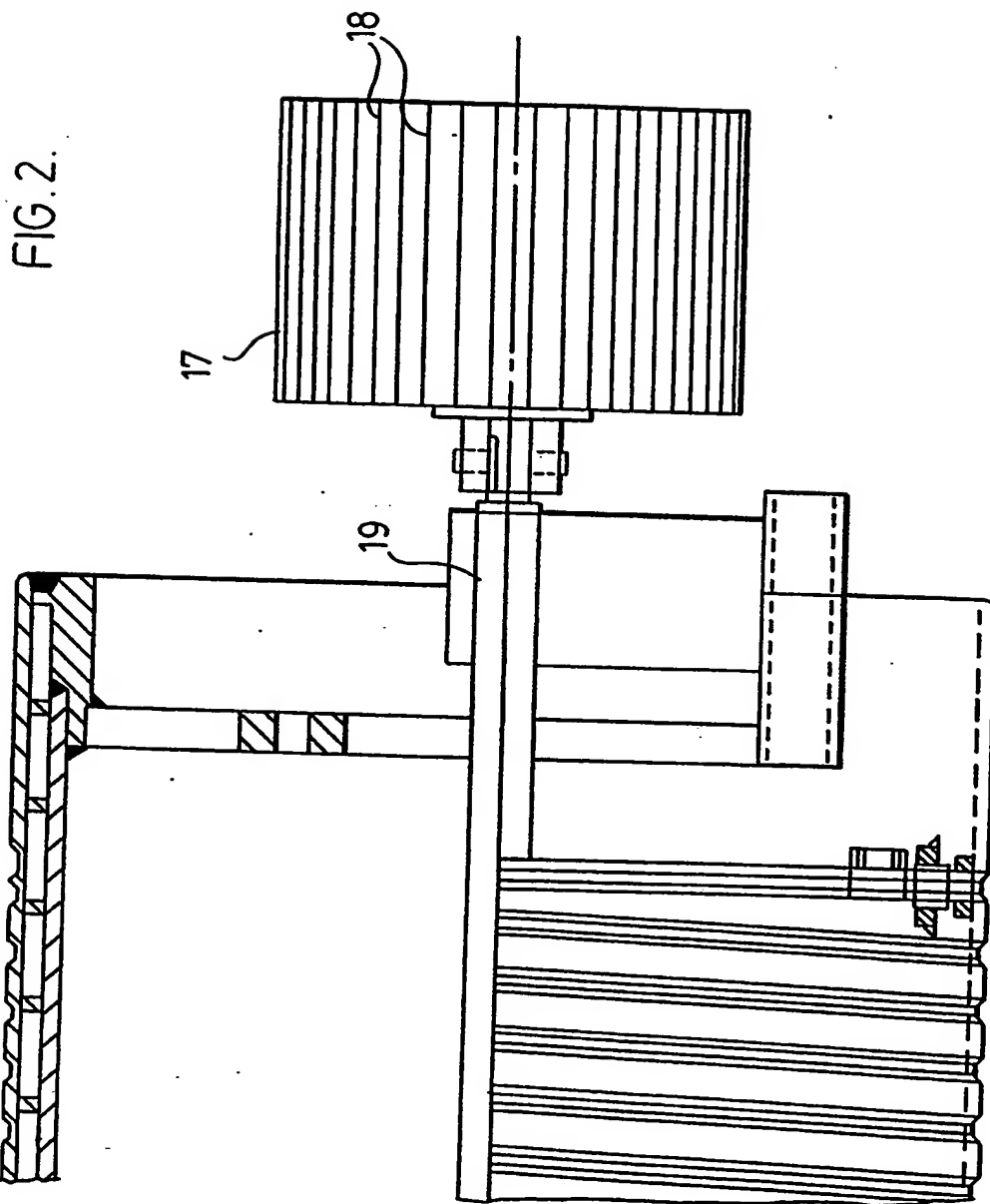


FIG.3.

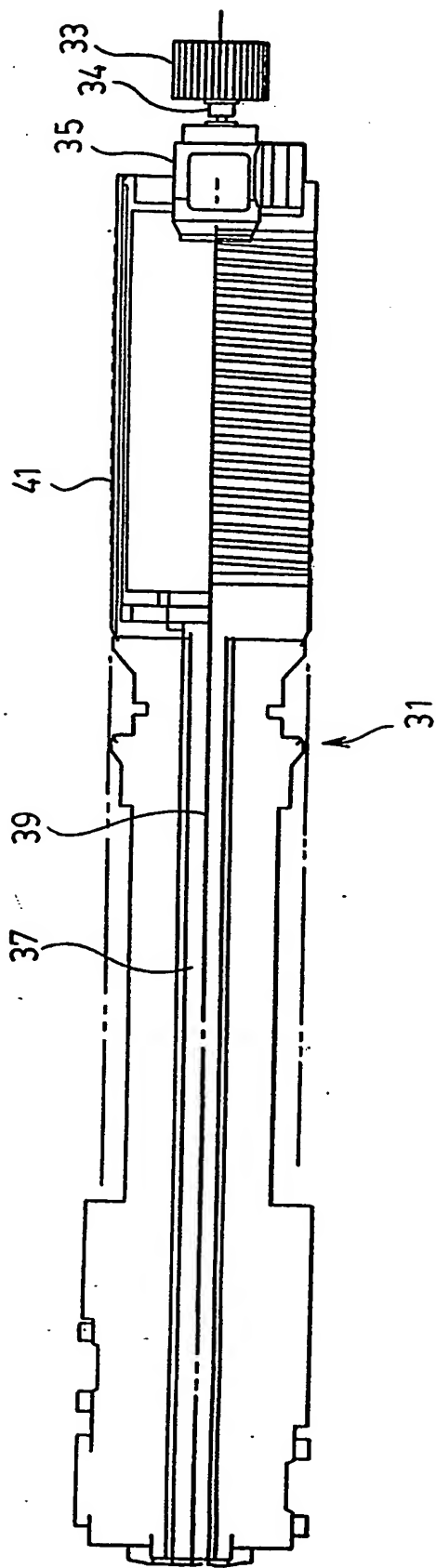
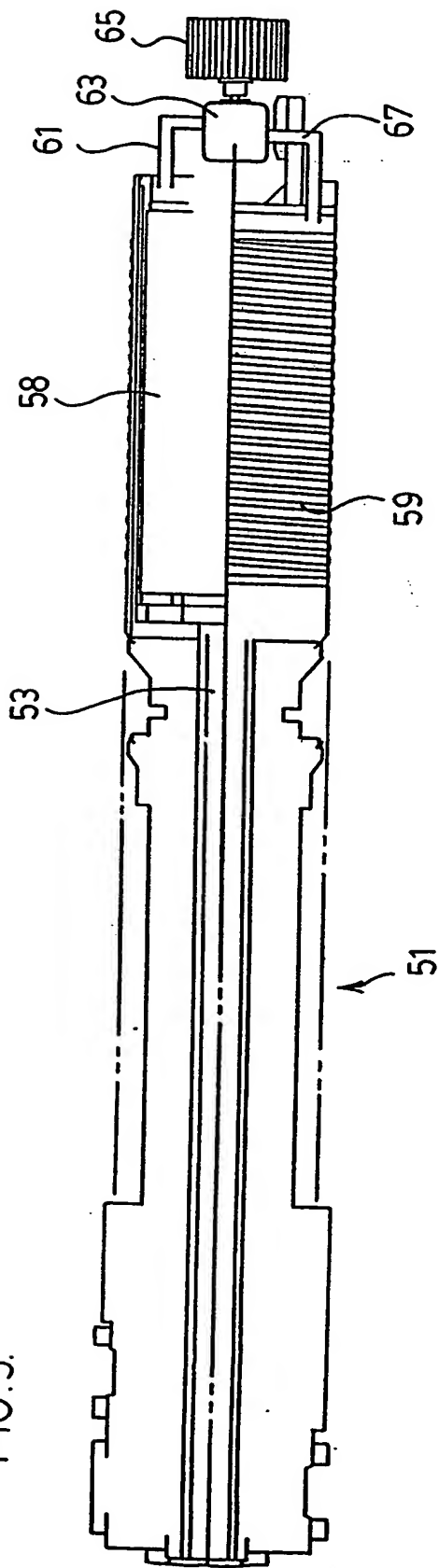


FIG.5.



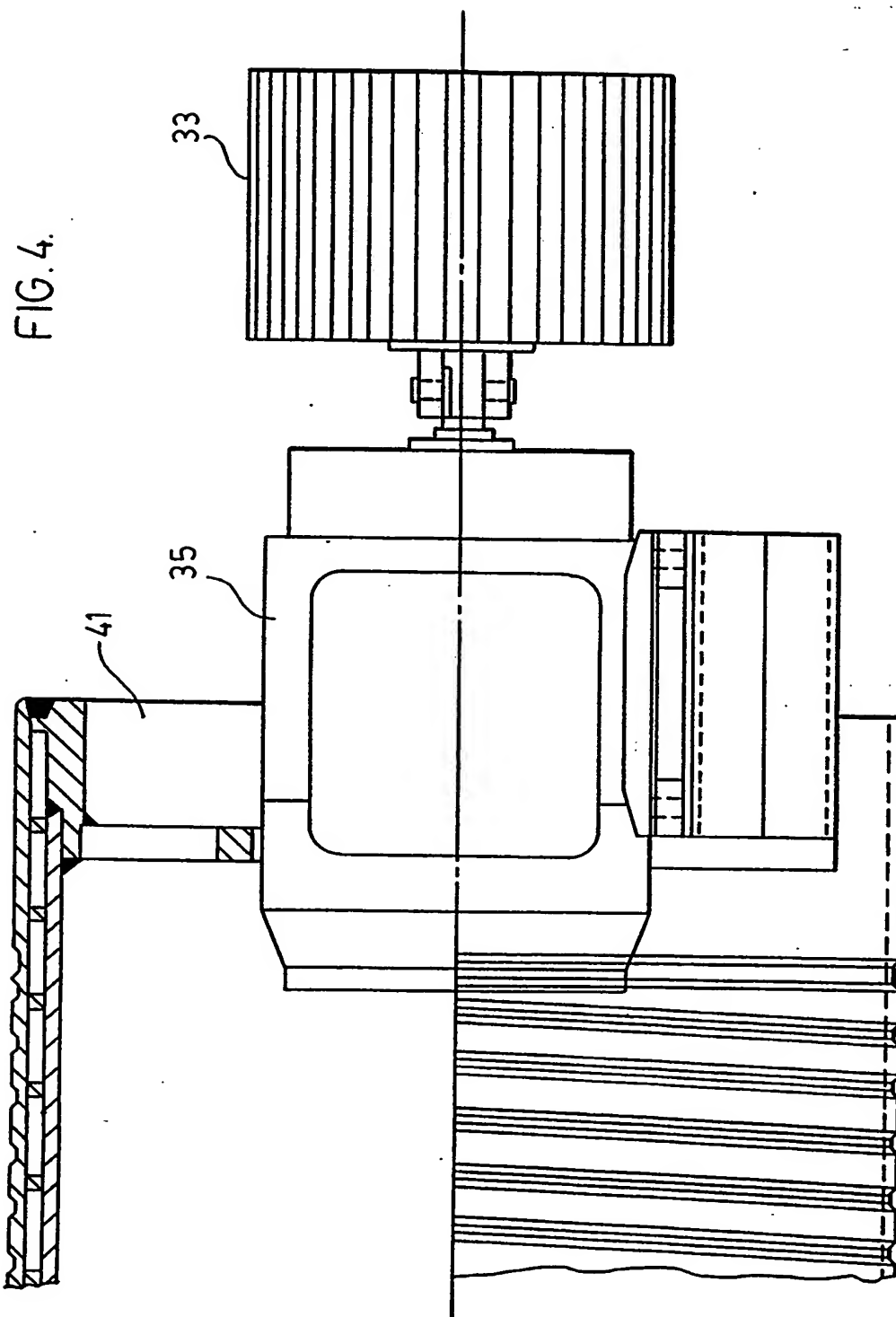


FIG. 6.

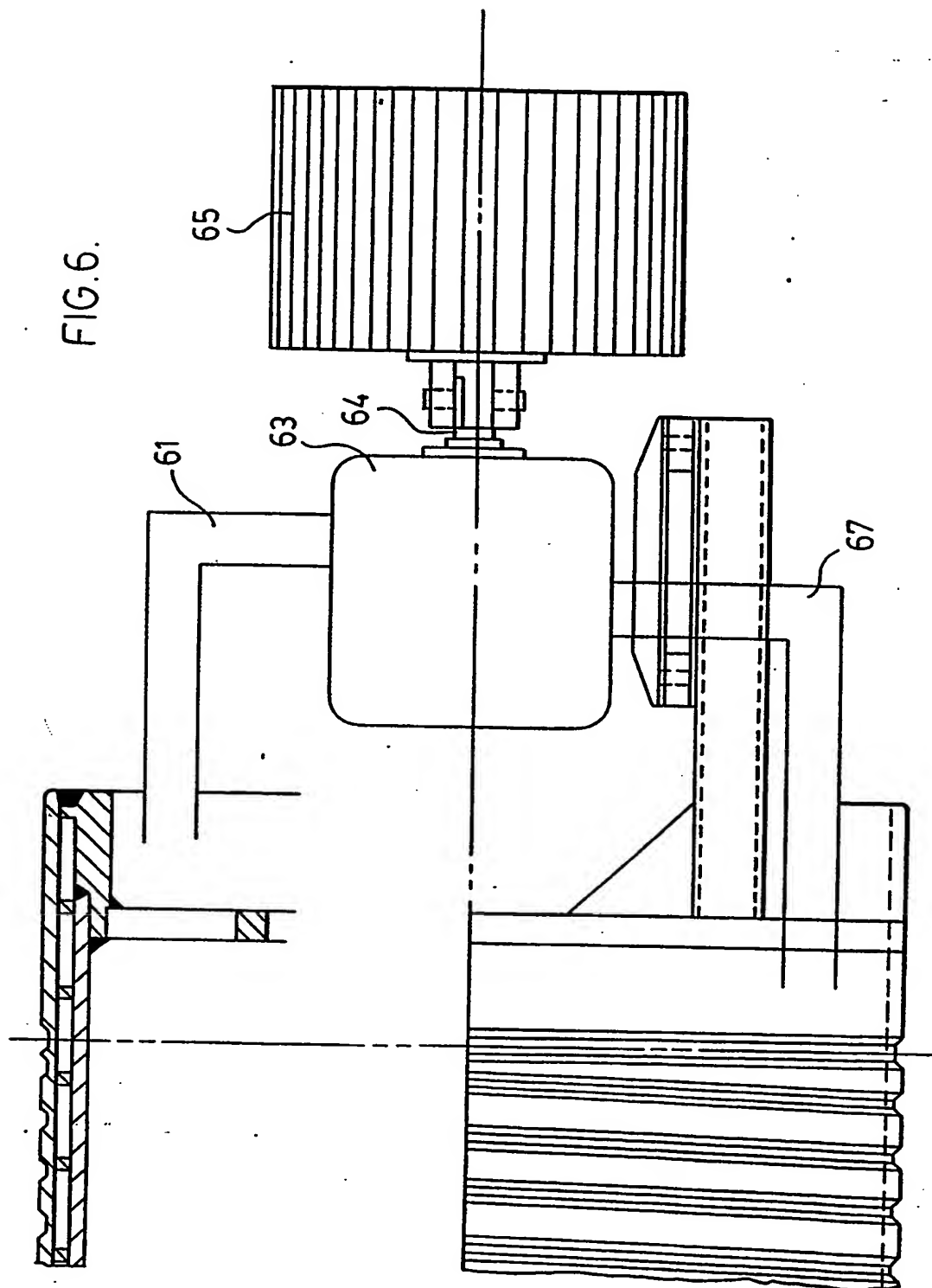
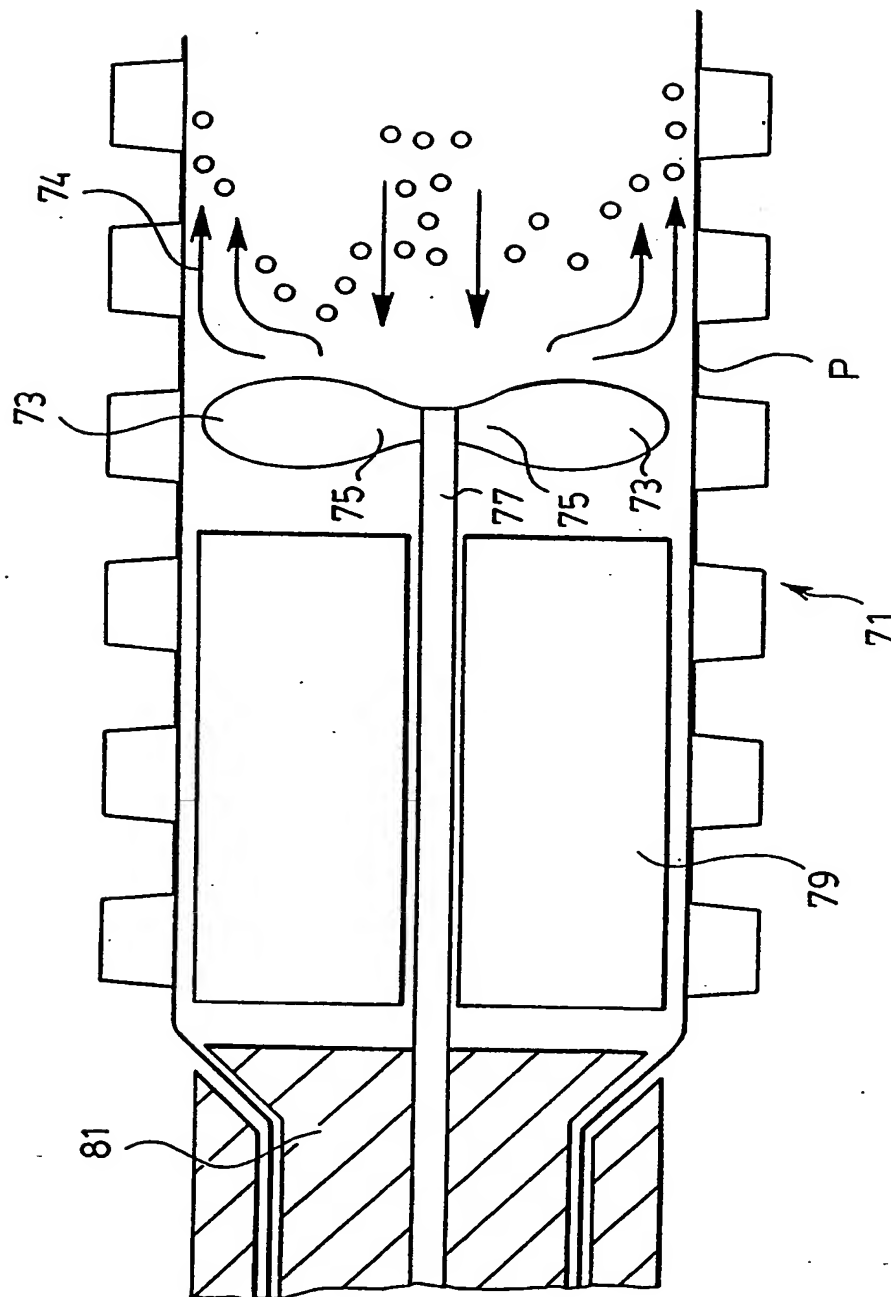


FIG. 7.



INTERNATIONAL ARCH REPORT

Application No
PCT/CA 03/01720

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B29C47/90 B29C47/00 B29C49/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 525 289 A (LUPKE MANFRED A A ET AL) 11 June 1996 (1996-06-11) column 3, line 54 - column 4, line 44; figures 5,6	1-11
X	WO 98/52739 A (LUPKE MANFRED ARNO ALFRED ; LUPKE STEFAN A (CA)) 26 November 1998 (1998-11-26) the whole document	1-11
A	US 4 319 872 A (LUPKE MANFRED A A ET AL) 16 March 1982 (1982-03-16) column 3, line 19 - column 4, line 58; figure 2	1-11
A	DE 24 55 779 A (WEBER JOHANNES) 12 August 1976 (1976-08-12) the whole document	1-11

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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *G* document member of the same patent family

Date of the actual completion of the international search

25 March 2004

Date of mailing of the international search report

05/04/2004

Name and mailing address of the ISA

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Authorized officer

Lorente Munoz, N

INTERNATIONAL SEARCH REPORT

Application No
PCT/CA 03/01720

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 97/38844 A (JAERVENKYLAE JYRI ; CONENOR OY (FI); KIRJAVAINEN KARI (FI)) 23 October 1997 (1997-10-23) page 7, line 20 - page 7, line 23; figure 3</p>	11

INTERNATIONAL SEARCH REPORT

list of patent family members

Application No

PCT/CA 03/01720

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			US 6551534 B1	22-04-2003

From the INTERNATIONAL BUREAU

12 MAY 2005

JUN 16 2004

PCT

NOTICE INFORMING THE APPLICANT OF THE
COMMUNICATION OF THE INTERNATIONAL
APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

JOHNSON, Scott, T.
Dennison Associates
133 Richmond Street West
Suite 301
Toronto, Ontario M5H 2L7
CANADA

Date of mailing (day/month/year)

03 June 2004 (03.06.2004)

Applicant's or agent's file reference

SJ-11889WO

IMPORTANT NOTICE

International application No.

PCT/CA2003/001720

International filing date (day/month/year)

12 November 2003 (12.11.2003)

Priority date (day/month/year)

18 November 2002 (18.11.2002)

Applicant

LUPKE, Manfred, A. , A. et al

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this notice:

AU, AZ, BY, CH, CN, CO, DZ, EP, HU, JP, KG, KP, KR, MD, MK, MZ, RU, TM, US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AE, AG, AL, AM, AP, AT, BA, BB, BG, BR, BW, BZ, CA, CR, CU, CZ, DE, DK, DM, EA, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, ID, IL, IN, IS, KE, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MG, MN, MW, MX, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, SC, SD, SE, SG, SK, SL, SY, TJ, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this notice is a copy of the international application as published by the International Bureau on 03 June 2004 (03.06.2004) under No. WO 2004/045829

4. **TIME LIMITS** for filing a demand for international preliminary examination and for entry into the national phase

The applicable time limit for entering the national phase will, subject to what is said in the following paragraph, be 30 MONTHS from the priority date, not only in respect of any elected Office if a demand for international preliminary examination is filed before the expiration of 19 months from the priority date, but also in respect of any designated Office, in the absence of filing of such demand, where Article 22(1) as modified with effect from 1 April 2002 applies in respect of that designated Office. For further details, see *PCT Gazette* No. 44/2001 of 1 November 2001, pages 19926, 19932 and 19934, as well as the *PCT Newsletter*, October and November 2001 and February 2002 issues.

In practice, time limits other than the 30-month time limit will continue to apply, for various periods of time, in respect of certain designated or elected Offices. For regular updates on the applicable time limits (20, 21, 30 or 31 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

For filing a demand for international preliminary examination, see the *PCT Applicant's Guide*, Volume I/A, Chapter IX. Only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination (at present, all PCT Contracting States are bound by Chapter II).

It is the applicant's sole responsibility to monitor all these time limits.

The International Bureau of WIPO
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1211 Geneva 20, Switzerland

Authorized officer

Athina Nickitas-Etienne

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Facsimile No. +41 22 338 89 95

June 18/04 Am

PATENT COOPERATION TREATY

In re application of: LUPKE, Manfred A. A. et al
Application No.: PCT/CA2003/001720
Filing Date: 12/11/2003
Priority Date: 18/11/2002
Title: Pipe Molding Apparatus With Mold Tunnel Air
Turbulence

Our Reference: SJ-11889WO

Richmond Street West
Suite 301
Toronto, Ontario M5H 2L7

August 3, 2004

Via: Facsimile 011-49-89-2399-4465

The International Preliminary Examining Authority
European Patent Office
D-80298 Munich
Germany

Attention: Formalities Officer

Dear Sir:

In response to the Written Opinion kindly amend that above application by replacing the first page of claims presently on file with the enclosed pages of claims. Also enclosed is a hand marked copy of the first page of claims showing two very simple amendments made to claim 1 in the application. More specifically, claim 1 has been amended to define that the means to provide air turbulence comprises a powered air moving member and that the power source is used for powering the air moving member.

Claim 1 as originally filed with this application and as amended by this amendment distinguishes over the prior art cited by the Examiner. If the Examiner will look for example to Figure 1 of the application the Examiner will see a powered air turbulator 17 located internally of the mold tunnel of the apparatus. A power source 21 is located externally of the apparatus and a power transfer means in the form of an elongated shaft 19 feeds from the power source 21 through the die tooling to turbulator 17.

The above combination of features found in newly submitted claim 1 clearly distinguishes over the prior art cited by the Examiner. More specifically, reference WO 98/52739 does not show a powered air turbulator located internally of a mold tunnel. Furthermore, rather than having a power transfer member feeding through die tooling, this particular prior art reference shows an air passage through the die tooling. Air is fed through that die tooling and impacts with a baffle 15 internally of the mold tunnel. This piece of prior art clearly does not show a power transfer member extending through die tooling to a power operated air turbulator internally of a mold tunnel.

Admittedly, United States Patent 5,525,289 shows in Figure 6 a power operated fan located internally of a mold tunnel. However, there is no power transfer from an external power source feeding through the die tooling to the fan. In contrast, as per Figure 5 of this patent, the power for operating the fan in the '289 reference is from a source which feeds upstream through the pipe to the fan and not downstream from the die tooling to the fan.

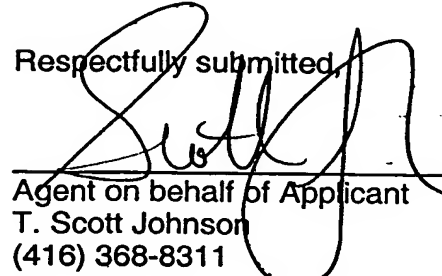
Applicant's invention is a substantial advance over what is shown in the '289 patent. In accordance with the present invention with the power transfer feeding through the die tooling there is no concern as to how the pipe will be pulled off of the apparatus. In other words, the power transfer to the air turbulator does not affect the downstream pipe release end of the apparatus.

A further and very important difference between Applicant's invention and what is shown in the '289 patent is found in claim 2 of the present application. More specifically, claim 2 clearly defines as supported by all of Applicant's drawings that Applicant's powered air moving member is located downstream of Applicant's cooling plug. According to this arrangement, the cooling plug which operates independently of the air turbulator initially sets the shape of the pipe and only after that does the air turbulator come into effect in holding the shape of the pipe. In contrast, in the '289 patent the fan shown in Figure 6 of that patent is actually located internally of the cooling plug. The fan is therefore used in conjunction with and draws support from the cool air located within the cooling plug. This is clearly different from what is defined in Applicant's claim 2 of the present application.

In view of the fact that all of the remaining claims are ultimately dependent upon claim 1 it is Applicant's position that these claims additionally distinguish over the prior art.

In view of the above, Applicant's awaits the results of further examination of this application.

Respectfully submitted,



Agent on behalf of Applicant
T. Scott Johnson
(416) 368-8311

SJ:jmc
Enclosure

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An extruding apparatus which extrudes continuous length of hollow plastic product, said apparatus
 5 comprising an extruder which feeds molten plastic through die equipment to a mold tunnel formed by side by side moving mold blocks, the plastic product being shaped within the mold tunnel, said apparatus including means to provide air turbulence to assist in setting shape of the
 10 product, said means comprising a powered air moving member which is located internally of the product in the mold tunnel, a power source for powering said air moving member, said power source being located externally of the mold tunnel, and a power transfer which feeds from said
 15 power source through said die equipment to said air moving member.

2. An extruding apparatus as claimed in Claim 1 wherein said apparatus comprises a vacuum forming plastic
 20 pipe extruder including a cooling plug within the mold tunnel, the product comprising a hollow pipe shaped between the mold blocks and the cooling plug, said air moving member being located downstream of and adjacent to the cooling plug, said power transfer feeding through the
 25 cooling plug to the air moving member.

3. An extruding apparatus as claimed in Claim 1 wherein said air moving member comprises a rotor.

- 30 4. An extruding apparatus as claimed in Claim 3 wherein said rotor comprises a bladed wheel.

5. An extruding apparatus as claimed in Claim 3 wherein said rotor comprises a plurality of blades having
 35 inner and outer blade portions, each of said blades being mounted at said inner blade portions to a common mounting

shaft for rotating said blades, said inner and outer blade portions being arranged such that said outer blade portions provide greater positive air pressure than said inner portions to produce a low pressure air draw at said
5 inner blade portions.

6. An extruding apparatus as claimed in Claim 5 wherein said mold tunnel has an open downstream end, the positive air pressure produced by said rotor causing an
10 exhausting of air along the pipe through the downstream end of the tunnel, the low air pressure air draw providing fresh make up air to be drawn into the tunnel through the downstream end of the tunnel.

15 7. An extruding apparatus as claimed in Claim 3 wherein said transfer member comprises a rotary shaft extending through said die equipment and the cooling plug to said rotor.

20 8. An extruding apparatus as claimed in Claim 7 including a motor for rotating said shaft, said motor being located externally of said die equipment and receiving power from an electrical power source.

25 9. An extruding apparatus as claimed in Claim 3 including a motor for turning said rotor, said motor being coupled with rotor in said mold tunnel, said transfer member comprising a an electrical power cord running through said die equipment and said cooling plug
30 from a source of electric power to said motor.

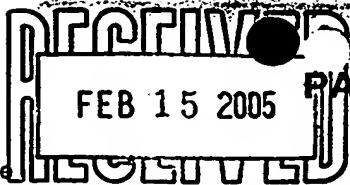
10. An extruding apparatus as claimed in Claim 3 wherein said rotor is driven by a water turbine adjacent said rotor in said mold tunnel, said transfer member
35 comprising a flow channel through said die equipment and said cooling plug, send flow channel delivery water under

pressure from a source of pressurized water externally of said die equipment to said water turbine.

11. An extruding apparatus a claimed in Claim 3
- 5 including a water supply for adding water to the air moved internally of the pipe by said air moving member.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An extruding apparatus which extrudes continuous
length of hollow plastic product, said apparatus
5 comprising an extruder which feeds molten plastic through
die equipment to a mold tunnel formed by side by side
moving mold blocks, the plastic product being shaped
within the mold tunnel, said apparatus including means to
provide air turbulence to assist in setting shape of the
product, said means comprising ^{a powered} ~~an~~ air moving member which
10 is located internally of the product in the mold tunnel,
a power source for ^{powering} ~~said~~ air moving member, said power
source being located externally of the mold tunnel, and a
power transfer which feeds from said power source through
15 die equipment to said air moving member.
2. An extruding apparatus as claimed in Claim 1
wherein said apparatus comprises a vacuum forming plastic
pipe extruder including a cooling plug within the mold
20 tunnel, the product comprising a hollow pipe shaped
between the mold blocks and the cooling plug, said air
moving member being located downstream of and adjacent to
the cooling plug, said power transfer feeding through the
cooling plug to the air moving member.
- 25 3. An extruding apparatus as claimed in Claim 1
wherein said air moving member comprises a rotor.
4. An extruding apparatus as claimed in Claim 3
30 wherein said rotor comprises a bladed wheel.
5. An extruding apparatus as claimed in Claim 3
wherein said rotor comprises a plurality of blades having
inner and outer blade portions, each of said blades being
35 mounted at said inner blade portions to a common mounting
shaft for rotating said blades, said inner and outer



RECEIVED PCT/PTO 12 MAY 2005

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

To:

JOHNSON, Scott, T.
Dennison Associates
133 Richmond Street West
Suite 301
Toronto, Ontario M5H 2L7
CANADADate of mailing
(day/month/year)

09.02.2005

Applicant's or agent's file reference

J. SS-11889W0

IMPORTANT NOTIFICATION

International application No.

PCT/CA 03/01720

International filing date (day/month/year)

12.11.2003

Priority date (day/month/year)

18.11.2002

Applicant

LUPKE, Manfred A. A. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international
preliminary examining authority:European Patent Office
D-80298 Munich
Tel. +49 89 23399 - 0 Tlx: 523656 epmu d
Fax: +49 89 23399 - 4465

Authorized Officer

Vatel, M

Tel. +49 89 23399-8225



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)

Applicant's or agent's file reference J.	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/CA 03/01720	International filing date (day/month/year) 12.11.2003	Priority date (day/month/year) 18.11.2002
International Patent Classification (IPC) or both national classification and IPC B29C47/90		
Applicant LUPKE, Manfred A. A. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 06.05.2004	Date of completion of this report 09.02.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tlx 523656 epmu d Fax +49 89 2399 - 4465	Authorized Officer Lorente Munoz, N Telephone No. +49 89 2399-2989 

Apr 18/05 AS

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/CA 03/01720**

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-8 as originally filed

Claims, Numbers

1-11 filed with telefax on 03.08.2004

Drawings, Sheets

1/6-6/6 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/CA 03/01720**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	5-11
	No: Claims	1-4
Inventive step (IS)	Yes: Claims	
	No: Claims	1-11
Industrial applicability (IA)	Yes: Claims	1-11
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA 03/01720

Reference is made to the following document:

D1: US-A-5 525 289

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 1 The application relates to an extruding apparatus for hollow plastic products with continuous length, said apparatus including means to provide air turbulence to assist in setting the shape of the product.
- 2 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1.
- 3 This document shows an extruding apparatus which extrudes continuous length of hollow plastic product (see abstract, figure 1) comprising the following features (the references in parentheses applying to this document):
 - an extruder which feeds molten plastic through die equipment to a mold tunnel formed by side by side moving mold blocks, the plastic product being shaped within the mold tunnel,
 - said apparatus including means to provide air turbulence to assist in setting shape of the product,
 - said means comprising a powered air moving member which is located internally of the product in the mold tunnel, a power source for said air moving member, said power source being located externally of the mold tunnel, and a power transfer which feeds from said power source through die equipment to said air moving member (implicitly disclosed: there must be a power source for the air moving member placed outside the die equipment).

The subject-matter of claim 1 is therefore not novel (Article 33(2) PCT).

- 4 In view of document D1, the additional features set out in dependent claims 2 to 4 are also already known and therefore the subject-matter of these claims is also not novel

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA 03/01720

(Article 33(2) PCT).

- 5 The features set out in dependent claims 5 to 11 concern design means which the person skilled in the art would take at his discretion and do not appear to involve an inventive step (Article 33(3) PCT).
- 6 Claims 1 to 11 meet the requirements of the PCT with respect to the industrial applicability (Article 33(4) PCT).

CLARITY

- 7 The application does not meet the requirements of Article 6 PCT, because claims 7, 9 and 10 are not clear. In particular, the reference to the "*transfer member*" is not clear, since this feature does not appear to have been disclosed in the preceding claims.

MINOR OBJECTIONS

- 8 Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
- 9 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
- 10 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

- 9 -

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An extruding apparatus which extrudes continuous length of hollow plastic product, said apparatus comprising an extruder which feeds molten plastic through die equipment to a mold tunnel formed by side by side moving mold blocks, the plastic product being shaped within the mold tunnel, said apparatus including means to provide air turbulence to assist in setting shape of the product, said means comprising a powered air moving member which is located internally of the product in the mold tunnel, a power source for powering said air moving member, said power source being located externally of the mold tunnel, and a power transfer which feeds from said power source through said die equipment to said air moving member.
2. An extruding apparatus as claimed in Claim 1 wherein said apparatus comprises a vacuum forming plastic pipe extruder including a cooling plug within the mold tunnel, the product comprising a hollow pipe shaped between the mold blocks and the cooling plug, said air moving member being located downstream of and adjacent to the cooling plug, said power transfer feeding through the cooling plug to the air moving member.
3. An extruding apparatus as claimed in Claim 1 wherein said air moving member comprises a rotor.
4. An extruding apparatus as claimed in Claim 3 wherein said rotor comprises a bladed wheel.
5. An extruding apparatus as claimed in Claim 3 wherein said rotor comprises a plurality of blades having inner and outer blade portions, each of said blades being mounted at said inner blade portions to a common mounting

shaft for rotating said blades, said inner and outer blade portions being arranged such that said outer blade portions provide greater positive air pressure than said inner portions to produce a low pressure air draw at said inner blade portions.

6. An extruding apparatus as claimed in Claim 5 wherein said mold tunnel has an open downstream end, the positive air pressure produced by said rotor causing an exhausting of air along the pipe through the downstream end of the tunnel, the low air pressure air draw providing fresh make up air to be drawn into the tunnel through the downstream end of the tunnel.

7. An extruding apparatus as claimed in Claim 3 wherein said transfer member comprises a rotary shaft extending through said die equipment and the cooling plug to said rotor.

8. An extruding apparatus as claimed in Claim 7 including a motor for rotating said shaft, said motor being located externally of said die equipment and receiving power from an electrical power source.

9. An extruding apparatus as claimed in Claim 3 including a motor for turning said rotor, said motor being coupled with rotor in said mold tunnel, said transfer member comprising a an electrical power cord running through said die equipment and said cooling plug from a source of electric power to said motor.

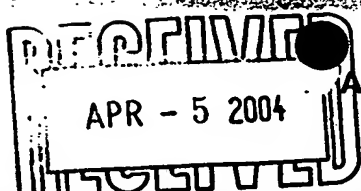
10. An extruding apparatus as claimed in Claim 3 wherein said rotor is driven by a water turbine adjacent said rotor in said mold tunnel, said transfer member comprising a flow channel through said die equipment and said cooling plug, send flow channel delivery water under

pressure from a source of pressurized water externally of said die equipment to said water turbine.

11. An extruding apparatus a claimed in Claim 3
5 including a water supply for adding water to the air moved internally of the pipe by said air moving member.

Empf.zeit:03/08/2004 12:42

Empf.nr.:034 P.007



Rec PCT/PTO 12 MAY 2005

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

To:

DENNISON ASSOCIATES
Attn: Johnson, Scott T.
133 Richmond Street West
Suite 301
Toronto, Ontario M5H 2L7
CANADA

Date of mailing
(day/month/year)

05/04/2004

Applicant's or agent's file reference

SJ-11889WO

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No

PCT/CA 03/01720

International filing date
(day/month/year)

12/11/2003

Applicant

LUPKE, Manfred A. A.

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Further action(s): The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90b/s.1 and 90b/s.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Malene Strarup

APR 18/04 AM

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the International application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

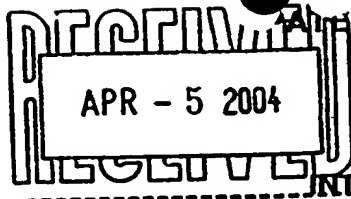
Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.



PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference SJ-11889WO	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, Item 5 below.	
International application No. PCT/CA 03/01720	International filing date (day/month/year) 12/11/2003	(Earliest) Priority Date (day/month/year) 18/11/2002
Applicant LUPKE, Manfred A. A.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☒ because this figure better characterizes the invention.

1
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA 03/01720

Box III TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

An extruding apparatus which extrudes continuous length of hollow plastic product has an extruder (3) which feeds molten plastic through die equipment (5) to a mold tunnel (7) formed by side by side moving mold blocks (9). The apparatus includes air turbulence internally of the product within the mold tunnel to assist in setting shape of the product. The air turbulence is provided by an air moving member (17) located internally of the product within the mold tunnel and a power source for the air moving member. The power source is located externally of the mold tunnel and a power transfer is provided to feed power from the power source through the die equipment to the air moving member without cooling of the die equipment.

INTERNATIONAL SEARCH REPORT

Application No
PCT/CA 03/01720

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B29C47/90 B29C47/00 B29C49/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 525 289 A (LUPKE MANFRED A A ET AL) 11 June 1996 (1996-06-11) column 3, line 54 - column 4, line 44; figures 5,6	1-11
X	WO 98/52739 A (LUPKE MANFRED ARNO ALFRED ; LUPKE STEFAN A (CA)) 26 November 1998 (1998-11-26) the whole document	1-11
A	US 4 319 872 A (LUPKE MANFRED A A ET AL) 16 March 1982 (1982-03-16) column 3, line 19 - column 4, line 58; figure 2	1-11
A	DE 24 55 779 A (WEBER JOHANNES) 12 August 1976 (1976-08-12) the whole document	1-11

-/-

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *&* document member of the same patent family

Date of the actual completion of the international search

25 March 2004

Date of mailing of the international search report

05/04/2004

Name and mailing address of the ISA

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Authorized officer

Lorente Munoz, N

INTERNATIONAL SEARCH REPORT

Application No

PCT/CA 03/01720

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 97/38844 A (JAERVENKYLAE JYRI ; CONENOR OY (FI); KIRJAVAINEN KARI (FI)) 23 October 1997 (1997-10-23) page 7, line 20 - page 7, line 23; figure 3</p>	11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 03/01720

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5525289	A	11-06-1996	CA 2210962 A1	08-08-1996
			WO 9623642 A1	08-08-1996
			DE 69608249 D1	15-06-2000
			DE 69608249 T2	21-12-2000
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			WO 9738844 A1	23-10-1997
			IL 126594 A	23-12-2001
			JP 2000508263 T	04-07-2000
			KR 2000005496 A	25-01-2000
			US 6551534 B1	22-04-2003

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An extruding apparatus which extrudes continuous length of hollow plastic product, said apparatus
5 comprising an extruder which feeds molten plastic through die equipment to a mold tunnel formed by side by side moving mold blocks, the plastic product being shaped within the mold tunnel, said apparatus including means to provide air turbulence to assist in setting shape of the
10 product, said means comprising an air moving member which is located internally of the product in the mold tunnel, a power source for said air moving member, said power source being located externally of the mold tunnel, and a power transfer which feeds from said power source through
15 die equipment to said air moving member.

2. An extruding apparatus as claimed in Claim 1 wherein said apparatus comprises a vacuum forming plastic pipe extruder including a cooling plug within the mold
20 tunnel, the product comprising a hollow pipe shaped between the mold blocks and the cooling plug, said air moving member being located downstream of and adjacent to the cooling plug, said power transfer feeding through the cooling plug to the air moving member.

25 3. An extruding apparatus as claimed in Claim 1 wherein said air moving member comprises a rotor.

4. An extruding apparatus as claimed in Claim 3
30 wherein said rotor comprises a bladed wheel.

5. An extruding apparatus as claimed in Claim 3 wherein said rotor comprises a plurality of blades having inner and outer blade portions, each of said blades being
35 mounted at said inner blade portions to a common mounting shaft for rotating said blades, said inner and outer

**REPLACED BY
ART 34 AMDT**

- 10 -

blade portions being arranged such that said outer blade portions provide greater positive air pressure than said inner portions to produce a low pressure air draw at said inner blade portions.

5

6. An extruding apparatus as claimed in Claim 5 wherein said mold tunnel has an open downstream end, the positive air pressure produced by said rotor causing an exhausting of air along the pipe through the downstream end of the tunnel, the low air pressure air draw providing fresh make up air to be drawn into the tunnel through the downstream end of the tunnel.

7. An extruding apparatus as claimed in Claim 3 wherein said transfer member comprises a rotary shaft extending through said die equipment and the cooling plug to said rotor.

8. An extruding apparatus as claimed in Claim 7 including a motor for rotating said shaft, said motor being located externally of said die equipment and receiving power from an electrical power source.

9. An extruding apparatus as claimed in Claim 3 including a motor for turning said rotor, said motor being coupled with rotor in said mold tunnel, said transfer member comprising a an electrical power cord running through said die equipment and said cooling plug from a source of electric power to said motor.

30

10. An extruding apparatus as claimed in Claim 3 wherein said rotor is driven by a water turbine adjacent said rotor in said mold tunnel, said transfer member comprising a flow channel through said die equipment and said cooling plug, send flow channel delivery water under pressure from a source of pressurized water externally of

REPLACED BY
ART 34 AMDT

- 11 -

said die equipment to said water turbine.

11. An extruding apparatus a claimed in Claim 3
including a water supply for adding water to the air
5 moved internally of the pipe by said air moving member.

REPLACED BY
ART 34 AMDT

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